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**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371**

ATTORNEY'S DOCKET NUMBER  
07508-033001

U.S. APPLICATION NO. (If Known, see 37 CFR 1.5)

09/914640

INTERNATIONAL APPLICATION NO.  
PCT/EP00/00508

INTERNATIONAL FILING DATE  
24 January 2000

PRIORITY DATE CLAIMED  
5 March 1999

**TITLE OF INVENTION**

ACTIVE INSTRUMENT FOR DETERMINING A POSITION IN NAVIGATION SYSTEMS FOR ASSISTING SURGICAL INTERVENTIONS

**APPLICANT(S) FOR DO/EO/US**

Manfred Schmid and Peter Konrad

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
4. ☐ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11 to 16 below concern other documents or information included:**

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.  
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:
  - ☒ International Search Report
  - ☒ International Preliminary Examination Report with Annexes
  - ☐
  - ☐
  - ☐

**CERTIFICATE OF MAILING BY EXPRESS MAIL**


Express Mail Label No. EL 485514336 US

I hereby certify under 37 CFR §1.10 that this correspondence is being deposited with the United States Postal Service as Express Mail Post Office to Addressee with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, Washington, D.C. 20231

8/31/01  
Date of Deposit

Signature

Typed Name of  
Person Signing

U.S. APPLICATION NO. (IF KNOWN) <b>097/914640</b>		INTERNATIONAL APPLICATION NO. PCT/EP00/00508		ATTORNEY'S DOCKET NUMBER 07508-033001	
17. <input checked="" type="checkbox"/> The following fees are submitted:  <b>Basic National Fee ( 37 CFR 1.492(a)(1)-(5) ):</b>  Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO..... <b>\$1000</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$860</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO..... <b>\$710</b>  International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4)..... <b>\$690</b>  International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100</b>  <div style="text-align: right;"><b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b></div>				<b>CALCULATIONS PTO USE ONLY</b>	
				\$860.00	
				\$0.00	
Surcharge of <b>\$130</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$0.00	
Claims	Number Filed	Number Extra	Rate		
Total Claims	6 - 20 =		x <b>\$18</b>	\$0.00	
Independent Claims	1 - 3 =		x <b>\$80</b>	\$0.00	
MULTIPLE DEPENDENT CLAIMS(S) (if applicable)			+ <b>\$270</b>	\$270.00	
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$1,130.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$0.00	
<b>SUBTOTAL =</b>				\$1,130.00	
Processing fee of <b>\$130</b> for furnishing the English Translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f))				\$0.00	
<b>TOTAL NATIONAL FEE =</b>				\$1,130.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property +				\$0.00	
<b>TOTAL FEES ENCLOSED =</b>				\$1,130.00	
				<b>Amount to be</b>	\$
				<b>refunded:</b>	
				<b>Charged:</b>	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$1,130.00 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. 06-1050 in the amount of \$0.00 to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 06-1050. A duplicate copy of this sheet is enclosed.					
<b>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive          (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</b>					
SEND ALL CORRESPONDENCE TO:					
Timothy A. French FISH & RICHARDSON P.C. 225 Franklin Street Boston, Massachusetts 02110-2804 (617) 542-5070 phone (617) 542-8906 facsimile			 SIGNATURE  Timothy A. French NAME  30,175 REGISTRATION NUMBER		

# Description

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## Active instrument for determining a position in navigation systems for assisting surgical operations

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The innovation relates to an active instrument for determining a position in navigation systems for assisting surgical operations.

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It is known to display the location of a surgical instrument or a pointing instrument (in the following just called instrument) in a patient's body on a monitor for a surgeon during operation. For this purpose, before operating, a tomogram, e.g. a computer tomogram (CT) or a magnetic resonance tomogram (MRT), of the part of the patient's body to be operated is recorded. During operation the instrument's position in space is detected by means of a measuring system, e.g. by means of two cameras, by analyzing the location of light sources fixed on the instrument. This location is displayed on a monitor together with the tomograms. The location of the patient or the part of the body to be operated during surgery is determined by markings being attached or being reproducibly attachable to the patient both during recording of the tomogram and during surgery. The location of these markings is detected during surgery. This may be done by getting the instrument to these markings and determining its position. Thus, the patient's position in space is known and there exists a definite relation between the patient's position and the tomograms.

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At known „active instruments“ of this kind the power supply of the instruments is effected via a cable. Such a cable is disturbing and causes problems at sterilizing the instrument.

It is also known to use an inserted accumulator for the power supply. For charging the accumulator and for sterilizing the instrument this accumulator has to be removed.

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It is an object of this invention to improve the power supply of an active instrument for determining a position in navigation systems for assisting surgical operations.

According to the present invention this object is solved in that the energy for the power supply of the instrument is supplied by means of a wireless power transmission means.

Preferably this is achieved by the instrument carrying at least one solar cell for its power supply.

During surgery the operation area usually is illuminated very brightly. This illumination can be used via the solar cell or solar cells for generating the relatively small electrical power necessary in the instrument e.g. for feeding light emitting diodes.

It is also possible that the instrument comprises a buffer (e.g. a capacitor) being chargeable by the solar cell for temporary buffering of power supply.

The instrument may comprise light sources for detecting the position of the instrument, which light sources are fed from the power supply. The instrument may also comprise a wireless communicating means which is also fed from the power supply. This communication means may serve for identifying the instrument or controlling the light source, e.g. for turning the light source on and off.

One embodiment of the invention is explained below referring to the accompanying drawing showing in the Figure an active instrument 10 schematically. The active instrument 10 includes light sources in the form of light emitting diodes 12, 14, 16 radiating in the infrared range and being observable by two cameras 24 responsive to infrared radiation. From images detected by the cameras 24 the location of the instrument 10 in space can be determined by image processing.

The instrument 10, for example a surgical instrument or a „pointer“, further includes a means 18 for wireless communication such as an infrared interface for data transfer. By this means the instrument 10 can be identified. Also a wireless control of the instrument 10, such as turning off and on the light sources 12, 14 and 16 or changing their brightness, is possible.

The power supply for the light sources 12, 14 and 16 and for the means 18 comprises a buffer for the power supply such as a capacitor 20. The buffer 20 is charged by the solar

cells 22, which solar cells get the necessary energy from an artificial light source 26 or from daylight.

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## Claims

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1. Active instrument for determining a position in navigation systems for assisting surgical operations, **characterized in that** the energy for the power supply of the instrument (10) can be supplied using a wireless power transmission means.
  2. Active instrument according to claim 1, **characterized in that** said instrument (10) comprises at least one solar cell (22) for its power supply.
  - 15 3. Active instrument according to claim 2, **characterized in that** said instrument (10) comprises a buffer storage unit (20) being charged from said solar cell (22) for buffering said power supply.
  - 20 4. Active instrument according to claim 3, **characterized in that** said instrument (10) can be subjected to a common sterilizing method (e.g. autoclaving).
  5. Active instrument according to one of claims 1 to 4, **characterized in that** it comprises light sources (12, 14, 16) for determining the position of said instrument (10), said light sources being fed from said power supply.
  - 25 6. Active instrument according to one of claims 1 to 5, **characterized in that** it comprises a wireless communication means (18) being fed from said power supply.

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New Claims

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(basis of IPER and accepted as being novel and inventive)

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1. Active instrument for determining a position in navigation systems for assisting surgical operations, **characterized in that** the instrument (10) comprises at least one solar cell (22) for its power supply.
  - 15 2. Active instrument according to claim 1, **characterized in that** said instrument (10) comprises a buffer storage unit (20) being charged from said solar cell (22) for buffering said power supply.
  3. Active instrument according to claim 1 or 2, **characterized in that** said instrument (10) comprises light sources (12, 14, 16) for determining the position of said instrument (10), said light sources being fed from said power supply.
  - 20 4. Active instrument according to one of claims 1 to 3, **characterized in that** said instrument (10) comprises a wireless communication means (18) being fed from said power supply.

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**COMBINED DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled ACTIVE INSTRUMENT FOR DETERMINING A POSITION IN NAVIGATION SYSTEMS FOR ASSISTING SURGICAL INTERVENTIONS, the specification of which:

[X] was filed on August 31, 2001 as U.S. Application Serial No. 09/914,640, and claims the priority of International Application No. PCT/EP00/00508 having an international filing date of January 24, 2000.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim the benefit under Title 35, United States Code, §119(e)(1) of any United States provisional application(s) listed below:

U.S. Serial No.	Filing Date	Status

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information I know to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. Serial No.	Filing Date	Status

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

Country	Application No.	Filing Date	Priority Claimed
PCT	PCT/EP00/00508	January 24, 2000	[x] Yes    [] No
Germany	299 04 018.6	March 5, 1999	[x] Yes    [] No

09/914,640 "0494T660"

**Combined Declaration and Power of Attorney**

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I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Full Name of Inventor: PETER KONRADInventor's Signature: *Peter Konrad*Date: 15.01.2002Residence Address: Brahmsweg 1, D-78333, Stockach, GermanyCitizenship: GermanPost Office Address: Brahmsweg 1, D-78333, Stockach, Germany

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